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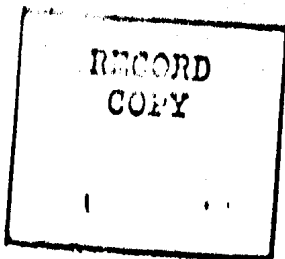
~~UNCLASSIFIED~~ INFORMATION ON SOVIET
BLOC INTERNATIONAL GEOPHYSICAL COOPERATION
-1960

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INFORMATION ON INTERNATIONAL GEOPHYSICAL COOPERATION ---

SOVIET-BLOC ACTIVITIES

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I. GENERAL

Text of TASS Report on the Meeting of the IUGG

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"The 12th General Assembly of the International Union of Geodesy and Geophysics, opening on 26 July in Helsinki, is the first major congress of geophysicists to be held after the completion of the period of IGY observations". This is the report given to a TASS correspondent by the head of the Soviet delegation, V. V. Belousov, Vice President of the Union. The scientists of our country will present about 200 reports to the Assembly.

In accordance with custom, the Soviet scientists, like the delegates of other countries, will present so-called national reports to the Assembly -- these are summary accounts of the research in the various fields of geophysics and geodesy conducted in the various countries in the period between assemblies.

The order of the day includes the adoption of a new constitution and the election of officers. ("General Assembly of the International Union of Geodesy and Geophysics", Ekonomicheskaya Gazeta, 26 July 1960, page 4)

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II. UPPER ATMOSPHERE

Report on Activities at the Byurakan Observatory

A recent feature article in the Ekonomicheskaya Gazeta reports on the facilities and activities at the Byurakan Astrophysical Observatory of the Academy of Sciences of the Armenian SSR.

The reporter points out that much important work has been accomplished at this institution, especially the discovery and investigation of star systems called star associations and blue galaxies.

A number of radiotelescopes are in operation at the observatory; one of them is a large interference radiotelescope with mirrors in the form of parabolic cylinders.

The scientists at the observatory, many from Yerevan University, have become tireless investigators of distant worlds. The observatory itself maintains scientific connections with almost five hundred scientific research institutions and scientists in fifty countries.

A large new observation tower has now been finished; it will house the world's second largest telescope. ("Explorers of Distant Worlds", by A. Shkulev, Ekonomicheskaya Gazeta, 29 July 1960, page 4)

Measurement of Corpuscular Radiation in the Upper Atmosphere

The authors of the article cited below, scientists at the Institute of Applied Geophysics, measured corpuscular radiation in the upper atmosphere during November and December 1958. Rockets were used,

attaining heights of ~ 100 km. The results are analyzed and compared with the values received by other researchers. ("Experimentation with Measurement of Corpuscular Radiation in the Upper Atmosphere", by L. A. Antonova and G. S. Ivanov-Kholodnyy, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 756-757)

Results of Simultaneous Photographic and Radar Observations of Auroras

At the "Roshchino" Station of the Institute of Physics of the Atmosphere of the Academy of Sciences of the USSR a research project was carried out in the first half of 1958 which involved radar observations of auroras and simultaneous photographing of the displays with a 180° wide-angle camera. The results of the observations are given in Tables 1 and 2.

The processing of the derived data indicates: (1) a greater density of luminescence of an aurora usually corresponds to a greater amplitude of the radio reflection signal, except in periods of pronounced magnetic disturbances, and in no case were radio reflections received when there were no auroras; (2) auroras with radiating forms are most often accompanied by the reception of radar reflections; (3) the difference in the azimuths of the most intense radio reflections and the most luminescent formations does not exceed 10° . At the time of the aurora of 11 February the divergence amounted to 20° . ("Some Results of Simultaneous Photographic and Radar Observations of Auroras", by V. I. Pogorelov and P. E. Martvel', Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 753-755)

Photoelectric Observations of Auroras

N. V. Dzhordzhio of the Institute of Physics of the Atmosphere of the Academy of Sciences of the USSR has published an article which summarizes the results of his photoelectric observations of pulsating forms of auroras. He found that (1) the emission of λ 6300 Å changes very slowly during the lifetime of pulsating forms of auroras; (2) the change in intensity of the emission of λ 5577 in PS is smoother and more even than for λ 3914 Å, and shows no "jumps"; (3) most of the derived values for the time and lifespan of 'S [OI] and 'D [OI] agree well with the computations made by Garstang as published in "The Airglow and the Aurorae", London, 1955. ("Photoelectric Observations of Pulsating Forms of Auroras", by N. V. Dzhordzhio, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 714-719)

Barsukov Presents Further Data on Three "Velocities" of Corpuscular Currents

Several articles have recently appeared in the literature dealing with three "velocities" of corpuscular currents and linking them with the passage of the F-region across the Sun's central meridian; O. M. Barsukov,

in the article cited below, presents new data to support the concept in question. ("Three 'Velocities' of Corpuscular Currents from Chromospheric Flares", by O. M. Barsukov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 743-745)

III. METEOROLOGY

Measurement of Electrical Charges in Artificial Mists and Natural Clouds

The authors of an article in the May 1960 issue of the Izvestiya of the Academy of Sciences of the USSR (Geophysical Series), workers at the Institute of Applied Geophysics of the Academy of Sciences, present the results of their research on measurements of the total charge of cloud particles as derived by two different methods. The methods are described, together with data on an instrument for use in measurement of the total charge of cloud particles. The results agree with values for total charge as computed on the basis of measurements of the individual charges in drops. ("Measurement of the Electrical Charges of Artificial Mists and Natural Clouds", by I. B. Pudovkina and A. P. Katsyka, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 707-713)

Automatic Meteorological Stations

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Provisions for obtaining meteorological measurements automatically are being made at the Main Geophysical Observatory (Leningrad). The testing of one of the experimental automatic stations is now underway. ("Briefly About Everything"; Moscow, Izvestiya, 4 Aug 60, page 3)

Soviet Radiosonde Reaches 136,710 Feet

Aerologists in the Northern Caucasus are conducting a study of upper layers of the stratosphere with the aid of special radiosondes. The aerological station headed by I. Mironov, launched a radiosonde to an altitude of 40,460 meters. This record, however, was shortlived. Associates of the station under A. Dudarevoya lofted a sonde 44,100 meters. It recorded a temperature at this altitude of minus 87 degrees. ("Briefly about Everything"; Moscow, Izvestiya, 28 July 1960, page 4)

IV. GEOMAGNETISM

"Influence of the Earth's Surface on the Electromagnetic Field of a Cylindrical Inhomogeneity"

The author of this fully documented paper on the influence of the Earth's surface on the anomalous electromagnetic field of a cylindrical inhomogeneity points out that this influence can be very substantial;

consequently, he indicates, when selecting a method for making measurements it is possible to make serious and basic errors if the method is based on the character of electromagnetic fields of local inhomogeneities without taking the Earth's surface into account. ("Influence of the Earth's Surface on the Electromagnetic Field of a Cylindrical Inhomogeneity", by B. P. D'yakonov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 736-742)

V. GRAVIMETRY

Further Research into Performance of Elastic Systems in Quartz Gravimeters

A study made by a worker at the Aerogravimetric Laboratory of the Institute of Physics of the Earth shows that there is a definite relationship between the displacement of the null point in quartz gravimeters and the size and twist of the filament in their elastic systems. ("On the Relationship Between the Displacement of the Null Point of Quartz Gravimeters and the Thickness of the Filament of the Elastic System", by Ye. I. Popov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 751-752)

VI. SEISMOLOGY

New Formula for Determination of the Energy of Seismic Waves of Arbitrary Form

An article appearing recently in a publication of the Academy of Sciences of the USSR provides the derivation of a formula for the computation of the energy of a Rayleigh surface wave of arbitrary form through the displacement and velocity of displacement of the soil at the point of observation. The new formula can be used as a basis for designing an instrument which will record the energy of surface waves -- an instrument which is now both necessary and feasible to develop. ("On the Determination of the Energy of Seismic Waves of an Arbitrary Form", by S. Ya. Kogan, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 644-652)

An Instrument for Recording the Energy of Seismic Waves

Specialists interested in current advances in seismological instrumentation will be interested in reading the detailed description of a new instrument for recording the current of energy of seismic waves that has been developed at the Institute of Physics of the Earth of the Academy of Sciences. The thousand-word description, to be found in the article cited below, is accompanied by a layout showing the circuits of

the instrument and by the formulas used in conjunction with the apparatus. ("The Use of A Magnetic Modulator and Resonance Amplifier in an Instrument for Recording the Current of Energy of Seismic Waves", by A. V. Rykov, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 746-749)

VII. OCEANOGRAPHY

Soviet Hydrostat Returned to Murmansk After Use at Sea

The expeditionary vessel "Tunets" has now returned to Murmansk. It was from aboard this vessel that the new Soviet deep-water hydrostat was tested; this hydrostat has been designed for underwater research in the seas and oceans. The hydrostat was built for the Polar Scientific Research and Design Institute of the Marine Fishing Industry and Oceanography (PINRO).

During the time the vessel was at sea in the Barents and Greenland Seas the hydrostat, together with the diver Vasily Kitayev, descended to a depth of 620 meters -- a depth unusual in this sort of research.

The deep-water hydrostat is equipped with searchlights, "flash-bulbs" for taking photographs, and a dependable 2-way telephone connection; the latter guarantees the normal continuation of the researcher's work, making it possible for him to transmit his observations to those aboard the ship.

Tests of the hydrostat were completed satisfactorily. Its use makes it possible to conduct, in particular, observations of the migration of the bass which lives at great depths and constitutes a prime object of search by Murmansk fishermen.

The ship "Tunets", accompanied by the hydrostat, will depart any day for its next voyage into the North Atlantic for observation of herring and the equipment used in catching it. ("Deep-Water Hydrostat for Underwater Research in Seas and Oceans", Ekonomicheskaya Gazeta, 27 July 1960, page 4)

Research Paper Reports on Vertical Variation of Water Temperature in the Black Sea

N. T. Glinskiy, of the Marine Hydrophysical Institute of the Academy of Sciences of the USSR, is the author of a recently published paper giving the results of investigations of vertical temperature variations in the waters of the Black Sea. Bathythermograph observations were made each 30 minutes. The periods of water temperature variations were 3; 5 and 6.5 hours. The periods of seiches in the Black Sea apparently have the same values. The author concludes that the vertical variations of temperature in the waters of the Black Sea are caused by internal seiches. ("On Vertical Variations of Water Temperature in the Black Sea", by N. T. Glinskiy, Izvestiya Akademii Nauk SSSR, Seriya Geofizicheskaya, No. 5, 1960, pages 688-697)

VIII. ARCTIC AND ANTARCTIC

Radio Reports from Antarctica for the Month of August 1959

The following is the full text of a report from Antarctica for the month of August 1959, as reported by A. G. Dralkin, Chief of the Fourth Antarctic Expedition:

Mirnyy Observatory:

Aerometeorological research:

The mean values at the Earth's surface during the month of August 1959 were: atmospheric pressure -- 985.8 mb; air temperature -- -17.2° ; wind velocity -- 1.9 m/sec; relative humidity -- 70%; overall cloudiness -- 5.5. The mean height reached by radiosondes was 23,000 m.

Zonal circulation predominated in the first 10-day period in the Atlantic and Indian Ocean sectors of Antarctica. At coastal stations to the east of Mirnyy there was sharply expressed cyclonic activity caused by the approach of lows passing across Drake Strait. The passage of a number of ridges in the troposphere in the western part of Eastern Antarctica resulted in a relatively high pressure background. Weak easterly winds intensified at the end of the 10-day period to jet streams of a south-southwesterly direction in both the upper and lower stratosphere.

The second 10-day period was characterized by alternating zonal and meridional circulation and relatively low pressure at coastal stations in Eastern Antarctica.

At the beginning of the 10-day period there were jet streams of short duration observed in the upper troposphere in the vicinity of Mirnyy; these jet streams were of a south-southwesterly direction. Strong easterly winds were also observed; they were observed in a layer up to 3 km. In the second half of the 10-day period weak winds from the westerly quadrant predominated throughout the troposphere; at the end of the 10-day period the wind once again assumed an easterly direction.

The third 10-day period was characterized by a sharply expressed zonal circulation of the atmosphere, low pressure and low temperatures along the entire coast of Eastern Antarctica.

Geophysical research:

In the first half of the month the magnetic field was slightly disturbed. Magnetic storms were observed on 16 and 20 August with amplitudes on the order of 1000-1500 γ . The storm of 20 August was brief. The field changed very rapidly. Minimum frequencies were above normal. Beginning in the middle of the month they had a well expressed diurnal march with a rise to 2-2.5 mc at noon and a drop to 1-1.3 mc in the second half of the day.

The critical frequencies in the E-layer increased and by the end of the month attained 3.0 mc. The sporadic layer appeared in the second half of the Greenwich day, but on fewer occasions than in July. The F_1 layer was observed in some cases.

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There was a drop in critical frequencies in the F_2 layer and a decrease in the diffuse state. At the end of August the critical frequency of the F_2 layer increased and attained 15 mc on 28 August.

Auroras in this period were seen less frequently and were for the most part of short duration.

In August 104 individual tremors and earthquakes were recorded and epicentral distances (from 2,300 to 11,000 km) were determined for 21 of them.

Hydrological research:

The depth in the vicinity of the hydrological tent attains 103 m. The temperature gradient from the surface to the bottom did not exceed 0.02° ; this indicates pronounced turbulent mixing of the entire water layer. This is confirmed by measurements of current velocity at different horizons.

The observed current velocity varied from 1-2 to 50-60 cm/sec during the course of the day.

Vostok Station:

The mean values at the earth's surface in August were: air temperature -69.6° ; pressure -- 622.5 mb; relative humidity -- 23%; temperature of the snow surface -- -71.6° ; wind velocity -- 5.8 m/sec. Overall cloudiness was 4. The prevailing wind direction was west-southwest.

Three snow surveys were made in an open area. The height of the snow cover increased by 1 cm in comparison with July. The mean density of the snow at the surface was 0.28 g/cm^3 . A bore hole 48 m in depth was completed.

With the return of the sun above the horizon observations were made of direct, scattered, total and reflected radiation.

The structure of the atmosphere during August was the same as in the preceding month. A thick near-surface inversion with an increase in temperature to -36° and even -48° was observed daily at a height of 3,800 - 4,000 m. The mean values of the levels of the isobaric surfaces changed to only an insignificant degree.

The tropopause was found to have a weak gradient; its upper boundary in all cases was far from clear, and on 15, 17, 21, 23 and 25 August it was completely impossible to distinguish the tropopause.

The state of the ionosphere in August was characterized by the appearance of the daily E-layer with an increase in critical frequencies toward the end of the month. The critical frequencies in the F_2 layer in the daytime hours attained 10 mc or more. Cases occurred in which the F_1 layer was observed. Complete absorption of radio waves was noted on 20 August for a period of 9 hours.

At the beginning and end of the month the magnetic field was relatively calm. A more stormy condition of the field was observed at the end of the second 10-day period. There were 13 calm days during the month, 14 were moderately disturbed, and there were 4 stormy days. In most cases the field was calmer in the second half of the day than in the first.

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Lazarev Station:

The mean values at the earth's surface during August were: air temperature -- -21.3° ; pressure -- 987.4 mb; relative humidity -- 85%; wind velocity -- 15 m/sec. The prevailing wind direction was east-southeasterly. There were 16 days with winds of storm force and 11 with winds of hurricane force. Total precipitation amounted to 250 mm. The snow cover in August increased by 7 cm. The maximum height reached by radiosondes was 19,740 m.

The shelf ice was explored for a distance of 4 km to the east of the station. To the southwest, in a region of crevasses, exposures of morainal material were discovered in the form of sand, sandy loam and pebbles. A large segment of the shelf ice split off at a distance of 5 to 10 km west of the station. Two kilometers to the south of the station an earlier reported snow bridge collapsed; it had crossed a narrow crevasse and had been 20 m wide. ("By Radio from Antarctica", by A. G. Dralkin, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 14, 1960, pages 33-35)

Abstracts of Articles from Issue 14 of the "Information Bulletin of the Soviet Antarctic Expedition, 1960"

(1) "Ice Layers in Eastern Antarctica", by N. F. Grigor'yev [North-eastern Division of the Permafrost Institute of the Academy of Sciences], pages 5-8.

Ice layers encountered in certain areas of the Antarctic continent represent the freezing of small streams consisting of melt water that has flowed over a solid basement. There are several types of ice encrustations of this type in Antarctica; this article illustrates two types and discusses them and others in respect to representative site, texture of the ice, thickness, seasonality, and other such characteristics.

(2) "Turbulent Heat Exchange in the Near-Surface Layer of Air in Antarctica", by N. P. Rusin [Main Geophysical Observatory], pages 9-13.

On the basis of data collected by Antarctic expeditions it may be regarded as proven that Antarctica is the only continent on the globe where the annual radiation balance of the underlying surface is negative. This means that losses of heat from the snow cover by means of reradiation exceeded the receipts of heat from radiation of the sun and sky.

It would seem that under such conditions there should be a decrease in the temperature of the underlying surface over a period of years, that is, there should be a cooling of the climate of Antarctica. But its temperature regime remains approximately constant or even has a tendency to warming. The reason for this stability of the temperature regime is turbulent heat exchange (L). Data for L is available now in considerable quantity.

On the basis of such initial data the monthly totals for turbulent exchange were computed for a series of Antarctic stations. The computation was made by the method of turbulent diffusion. Table 1 lists values for Mirnyy, Shackleton Shelf Ice, Port Martin, Dumont D'Urville, Mawson, Norvegia, Showa, McMurdo, Halley Bay, Little America, Franheim, Pionerskaya, Vostok-1, Komsomolskaya, Vostok, Sovetskaya, Sharko, Byrd, Amundsen-Scott, Gauss, Belgica, and BC-4.

The table shows that Antarctica may be divided into four zones on the basis of annual totals for turbulent heat exchange.

(3) "On the Principal Forms of Atmospheric Circulation in Antarctica", by P. D. Astapenko [Leningrad Hydrometeorological Institute], pages 14-18.

Six variants of meridional circulation are known for Antarctica and four variants of zonal circulation. These various forms occur, generally, when certain synoptic conditions prevail. Approximately 20 different synoptic situations are possible. This article reviews two cases -- one zonal and one meridional -- as illustrative cases and discusses them in some detail to support the author's contention.

(4) "Currents in the Bellingshausen Sea Area", by I. V. Maksimov [Leningrad Advanced Marine Engineering School], pages 19-23.

This article reports that currents in the Bellingshausen Sea area were investigated by the dynamic method on the basis of observations made at 135 deep-water hydrological stations. A map accompanying the article shows marine currents in this area at the surface and at depths of 200 and 600 m. On the basis of all available data the author draws a number of conclusions about the observed currents at the various levels.

(5) "Observation of Earth Currents at the Mirnyy and Oasis Stations in 1957", by L. N. Baranskiy and N. L. Naumenkov [Institute of Physics of the Earth], pages 24-28.

The Second Continental Expedition was charged with making observations of earth currents at the stations of Mirnyy and Oasis, together with recording of micropulsations of the magnetic field, beginning on 1 July 1957. This article fully describes the instruments used during that period. A number of paragraphs are devoted to the influence and cause of natural and artificially induced static and methods for overcoming it. The article then proceeds to give the values for representative observations, comparing the two stations, and interpreting the results.

(6) "Large-Scale Catching of Euphausia superba from a Whaling Vessel with a Variable-Depth Trawl", G. A. Solyanik [Odessa Biological Station], pages 29-30.

Scientific workers and seamen of the Soviet Antarctic Whaling Flotilla "Slava" have been concerned for several years with the problem of the commercial exploitation of the immense reserves of Euphausia superba found in the Southern Hemisphere. Trawling equipment, described here briefly, has been devised to harvest this resource. This product of the sea can be used in the form of meal as fodder for livestock, and may have uses of a higher order.

(7) "Search for the Banzare Bank", by V. N. Mal'tsev [Hydrographic Office of the Main Administration of the Northern Sea Route], pages 31-32.

The submarine Banzare Bank was discovered by an Antarctic expedition in 1929. Its maximum depth was reported as 186 m (59°22' S., 76°53' E.). An expedition aboard the diesel-electric motor ship Ob' in 1957 established that such shallow depths do not exist in that area. The Second and Fourth Continental Expeditions fixed the depth where this bank was said to be at more than 1,000 m. The Second Marine Expedition discovered a minimum depth of 851 m to the north of Banzare Bank; the Fourth Continental Expedition found a minimum depth of 715 m to the northeast of the Banzare Bank.

It must be assumed that the position of Banzare Bank is incorrectly plotted on the map, but there is little doubt that it exists. The experience of Soviet expeditions in mapping the coast of Antarctica has shown that the shore line previously shown on Soviet and foreign small-scale maps should be moved eastward.

(Abstracts of articles, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 14, 1960, pages 5-32)

Life and Work at Lazarev Station

The following is a brief summary of a short article on life and activities at the Soviet polar station Lazarev:

At the end of March (1959) monthly observations were begun of the accumulation of snow and the hardness of the snow surface along a 5-meter glaciological profile. On 5 April the first measurements were made of the temperature in a layer of snow to a depth of 160 cm.

In the six month period beginning on 10 February there were 107 days with winds of storm force and 55 days with winds of hurricane force. The velocity of the hurricane-force winds does not usually exceed 40-50 m/sec, but sometimes attains 60-70 m/sec.

Those severe winds caused much trouble and greatly hindered the work of the observers; they broke instruments and searchlights, broke the cables leading to remotely-controlled devices and blew away surface thermometers. Strong winds made it very difficult to launch radiosondes; in some cases repeated efforts were fruitless. Much labor was expended in digging out drums containing fuel and the periodic cleaning of tractors and other vehicles. (Life and Work at Lazarev Station", by Yu. A. Kruchinin, Informatsionnyy Byulleten' Sovetskoy Antarkticheskoy Ekspeditsii, No. 14, 1960, pages 35-36)

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